

23. $A = 50.0 \text{ cm}$

$$d = 8.0 \text{ m}$$

$$t = 4.5 \text{ s}$$

$$v = \frac{d}{t} = \frac{8.0 \text{ m}}{4.5 \text{ s}} = 1.78 \text{ m/s}$$

4 cycles in 1 s

$$f = \frac{N}{\Delta t} = \frac{4}{1 \text{ s}} = 4 \text{ Hz}$$

$$\lambda = \frac{v}{f} = \frac{1.78 \text{ m/s}}{4.0 \text{ Hz}} = 0.44 \text{ m}$$

$$\begin{aligned} 24. \quad f &= 60.0 \text{ Hz} \\ T &= 0.017 \text{ s} \\ V &= 343 \text{ m/s} \\ \lambda &= \frac{V}{f} = \frac{343 \text{ m/s}}{60 \text{ Hz}} \\ &= 5.7 \text{ m} \end{aligned}$$

$$25. \lambda = 2.6 \text{ cm} \rightarrow 0.026 \text{ m}$$

$$f = \frac{60 \text{ crests in } 42 \text{ s}}{42 \text{ s}}$$

$$= 1.43 \text{ Hz}$$

$$v = f \lambda$$

$$= 1.43 \times 0.026$$

$$= 0.037 \text{ m/s}$$

$$d = 3700 \text{ km} = \underline{3700000} = 3.7 \times 10^6 \text{ m}$$

$$t = 5.2 \text{ hr} \rightarrow \times 60 \times 60 = 18720 \text{ s}$$

$$v = \frac{3.7 \times 10^6 \text{ m}}{18720 \text{ s}} = 197.65 \text{ m/s}$$

$$f = 2.9 \times 10^{-4} \text{ Hz}$$

$$\lambda = \frac{v}{f} = \frac{197.65 \text{ m/s}}{2.9 \times 10^{-4} \text{ Hz}} = 681500 \text{ m}$$

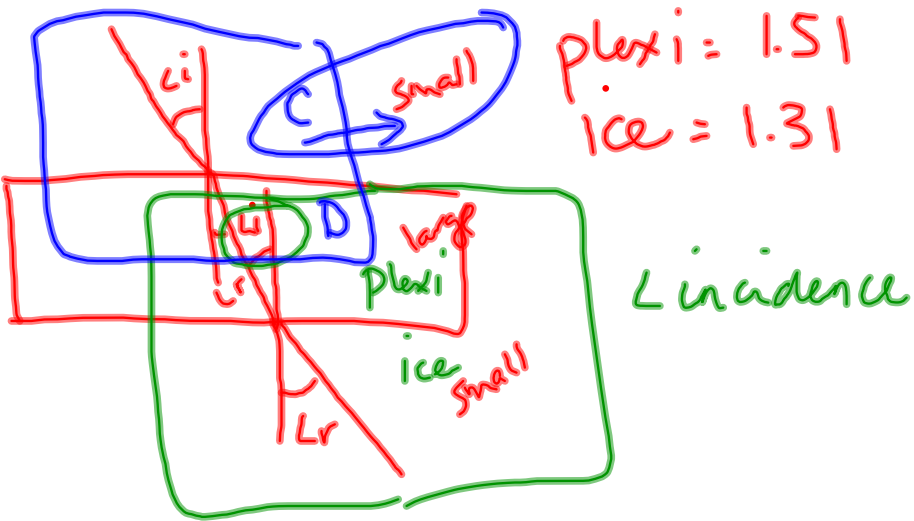
$$28. \lambda = 3.5 \text{ m}$$

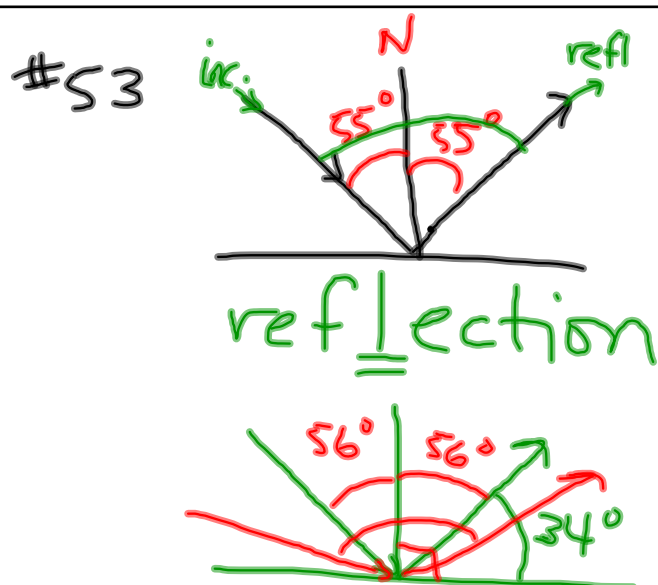
$$d = 0.5 \text{ km} \Rightarrow 500 \text{ m}$$

$$t = 2.00 \text{ m} \Rightarrow 120 \text{ s}$$

$$v = \frac{d}{t} = \frac{500 \text{ m}}{120 \text{ s}} = 4.2 \text{ m/s}$$

$$a) f = \frac{v}{\lambda} = \frac{4.2 \text{ m/s}}{3.5 \text{ m}} = 1.2 \text{ Hz} \quad b) T = 0.83 \text{ s}$$





56. $n_1 = 1.33$
 $n_2 = ?$
 $\angle i = 70^\circ$
 $\angle r = 40^\circ$

$$\frac{n_2}{n_1} = \frac{\sin \angle i}{\sin \angle r}$$

$$\rightarrow \frac{n_2}{1.33} = \frac{\sin 70^\circ}{\sin 40^\circ} = \text{don't round.}$$

$$= 1 - 2.42$$

$$= 1.94$$

57. $\angle i = 20^\circ$
 $\angle r =$
 $n_2 = 1.33$
 $n_1 = 1.51$

$$\frac{n_2}{n_1} = \frac{\sin \angle i}{\sin \angle r}$$

$$\div \frac{1.33}{1.51} \leftarrow \frac{\sin 20^\circ}{\sin \angle r} \quad 2^{\text{nd}} \sin = 22.8^\circ$$

